

REMARKS

CLAIM REJECTIONS 35 USC 103

Claims 1-23 have been rejected as being obvious over Tangen in view of Hoshuyama.

Applicant respectfully traverses this rejection and submits that i) the combination of Tangen and Hoshuyama does not teach or suggest the invention set forth in the Claims, ii) one of ordinary skill in the art would not be motivated to combine Tangen and Hoshuyama and that iii) the combined references would not yield the invention set forth in the Claims.

In the remarks of August 27, 2009, Applicant has stated the following with regard to the Tangen reference.

"Tangen is related solely to micro-cameras. By contrast, the instant invention is a nano-camera. The difference is not merely one of scale. If that were the case, then even Tangen would be unpatentable in light of an already known telescope array, the Very Large Array."

"Applicant solves unique problems that Tangen does not even attempt to solve. The Tangen patent is a *micro* camera operating on Newtonian principles as do all other cameras. Applicant's invention is a *nano*-imaging device/camera as required in Claim 1 and solves problems unique to photon and wave behavior at quantum levels, as recited in Claims 16-20. The inventive *nano*-camera admits only certain wavelengths of light based on aperture variation and diffraction at this sub-micron level. It therefore solves problems unique to *nano*-level light..."

In the current Office Action (and in that of December 10, 2009), the Examiner did not respond to Applicant's above argument. The Examiner maintains that Tangen teaches a "nano-imaging apparatus comprising multiple optical elements of sub-micron." It is respectfully submitted that Tangen does not teach a "nano-imaging apparatus."

The Examiner further stated that Hoshuyama teaches "optical elements in nanometer scale having more than one pixel per optical element." Applicant respectfully disagrees with the Examiner's assertion.

The Hoshuyama reference is directed to improving existing image sensors by utilizing dichroic mirrors to further separate light incoming through a single opening. This increases photon utilization efficiency and reduces false color that is sometimes introduced as a result of color interpolation.

It is respectfully submitted that Hoshuyama does not teach or suggest a device having more than one pixel per optical element. Hoshuyama describes improving the well-known Bayer Array (see col. 1, line 50) by adding dichroic mirrors as described above. However, Hoshuyama, does not by any means teach or suggest a device that has more than one pixel per optical element. Rather, the light entering through the optical element described by Hoshuyama contributes to one pixel – and not to "more than one" as set forth in Claim 1.

The Examiner further stated that "it would have been obvious to one of ordinary skill in the art at the time the invention was made to reduce the micro-camera of Tangen to the nano level of Hoshuyama." In response, Applicant submits that Hoshuyama does not teach or suggest anything of nano scale. The microlens disclosed by Hoshuyama is standard on digital cameras. Applicant is unsure how the Examiner interpreted Hoshuyama as suggesting a device being at nano scale.

It is further submitted that one of ordinary skill in the art would not be motivated to combine the Tangen and Hoshuyama. Specifically, Hoshuyama teaches a system for *enhancing* photon utilization of standard-sized cameras (it is not and does not even claim to be a camera), whereas Tangen is directed to *reducing* the size of standard cameras. Furthermore, one of ordinary skill in the art reading Tangen and Hoshuyama would not be motivated to combine the teachings thereof in order to arrive at a nano-scaled device. There is no teaching or suggestion in those references that would take account of necessary requirements (e.g. more than one pixel per optical element) for producing a nano-scaled device.

Still further, even assuming, arguendo, that one of ordinary skill in the art would be motivated to combine the cited references – doing so would not yield the invention set forth in Claim 1. There is nothing in the references that teach or suggest “A nano-imaging apparatus comprising multiple optical elements of sub-micron, nanometer scale having more than one pixel per optical element...” In addition, it would be technically and physically impossible to combine the teachings of Tangen and Hoshuyama. That is because in order to resolve three different colors from one signal, there needs to be dichroic mirrors - set at 45 degree angles in order to transfer the light to all of the light receiving surfaces. The amount of space required for this arrangement would not be feasible in a nano (or even micro) sized cameras.

The above notwithstanding, Applicant has amended Claim 1 to clearly distinguish the prior art. Claim 1 has been amended to recite that the optical elements “gather overlapping information” and “whereby an image is obtained from said overlapping information.” That is, several optical elements gather overlapping information, which ultimately contributes to the final image. This is not taught or suggested by the prior art and, in fact, Tangen teaches away from this limitation. Tangen (p. 8 line 38-39) states that “Each lens L generates an image of the scene to be imaged with the desired total resolution in the final

image." The "desired resolution" in Tangen derives from each lens – and not from overlapping information gathered by optical elements as Claim 1 has been amended to recite.

Claims 2-23, which depend from Claim 1 are similarly limited and they are therefore believed to be allowable as well.

In view of the fact that the prior art references – either individually or in combination – do not teach or suggest "A nano-imaging apparatus comprising multiple optical elements of sub-micron, nanometer scale having more than one pixel per optical element . . ." and in view of the amendments to Claim 1, Applicant believes that the application is in condition for allowance.

Respectfully submitted,



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